

BUDGET AVAILABILITY

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ABSTRACT

The report describes a forecast of the total NASA budget required to achieve a manned mission to Mars at around the end of this century. A methodology is presented for projecting the major components of the NASA budget, including the NASA base, Space Flight, Space Station, Shuttle Derived Launch Vehicle, and the Manned Mars Mission. The NASA base, including administrative expenses, construction of facilities and research and development other than manned space flight, is assumed to level off at the present (1985) level and remain constant at approximately \$3.5 billion (constant fiscal year 1985 dollars). The budget for Space Flight, which consists of Shuttle research and development, operations, and tracking and data acquisition costs, is projected to decrease from approximately \$4 billion in 1985 to just under \$2.5 billion by 1989 and then level off. Planning profiles for three new major programs are constructed: (1) a permanently manned Space Station; (2) a Shuttle Derived Vehicle; and (3) a Manned Mars Mission. It is concluded that all of the new programs can be conducted by the year 2002 with a 3 percent real growth rate in the total NASA budget.

INTRODUCTION

This report contains an estimate of the total NASA budget required to support a manned Mars mission at around the turn of the century. The purpose of this report is to document the methodology, groundrules and assumptions used in preparing the forecast. The following sections will describe the scope of the analysis and the method used to project each major element of the budget.

SCOPE

The budget projection includes all NASA outlays for direct program expenses during the period from fiscal year 1987 thru fiscal year 2010. Specifically excluded are any expenses which will eventually be paid for by someone other than NASA, such as the launch of commercial satellites.

GROUND RULES

All costs presented in this report are in constant fiscal year 1985 dollars. Historical data thru 1984 are actual direct program costs,

inflated to 1985 dollars using the NASA R&D index for advanced programs. Budget data for 1985 and 1986 are estimates from the Budget of the United States Government. Other assumptions for major categories of the budget are listed in Table 1.

RESULTS

Forecast results for major categories and subcategories of the present budget are shown in Figure 1 and Figure 2. Planning profiles for the Space Station, the Shuttle Derived Vehicle, and the Manned Mars Mission are depicted in Figures 3-5. A list of abbreviations to assist in deciphering the graphs is included in Table 2.

CONCLUSION

A summation of all the major budget categories is shown in Figure 6. Also shown is total NASA budget if a 3 percent real growth rate beginning in 1986 is assumed. The illustration demonstrates that the Manned Mars Mission as well as a Space Station and a Shuttle Derived Vehicle could be developed in the time period shown within the 3 percent growth line. The 3 percent growth rate is based on the assumption that NASA budget remains a constant percent of gross national product (GNP) and that GNP continues to grow at an average rate of approximately 3-4 percent per year as it has for more than 100 years.

TABLE 1
FORECAST METHODOLOGY

NASA Base:

- FY85-86 estimates from the President's FY1986 budget
- FY87-2010 3 year moving average

Manned Space Flight:

TDRSS:

- FY85-86 estimates from the President's FY1986 budget
- FY87-2010 3 year moving average

Other:

- FY85-86 estimates from the President's FY1986 budget
- FY87-90 OSF 1986 congressional budget
- FY87-2010 3 year moving average

Space Station:

- \$8 billion IOC cost
- \$300 million annual operations cost
- 60/40 spread for 5 year development program

Shuttle Derived Vehicle (SDV):

- \$5 billion development cost (2 flight units)
- 60/40 spread for 6 year development program
- \$100 million per flight
- 8 flights per year

Mars:

- \$27 billion IOC cost estimate
- \$1 billion for LEO assembly facility
- operations cost included in IOC cost estimate
- 50/50 spread for 12 year development program

Total NASA budget:

- NASA budget equals fixed percent of GNP
- GNP average annual growth at 3% in constant year dollars

LIST OF ABBREVIATIONS

APPL	Science and Applications
CF	Construction of Facilities
DDT&E	Design, Development, Test and Evaluation
ETB	Engineering and Technical Base
FY	Fiscal Year
HDWR	Hardware
IOC	Initial Operating Capability
MISC	Miscellaneous
OPS	Operations
OSF	Office of Space Flight
PROD	Production
REQTS	Requirements
RPM	Research and Program Management
R&D	Research and Development
R&T	Research and Technology
SCI	Space Science
SDV	Shuttle Derived Vehicle
SFCD	Space Flight Control & Data Communications
SS	Space Station
STS	Space Transportation System
TDRSS	Tracking and Data Relay Satellite System

FIGURE 1
NASA BUDGET BASE

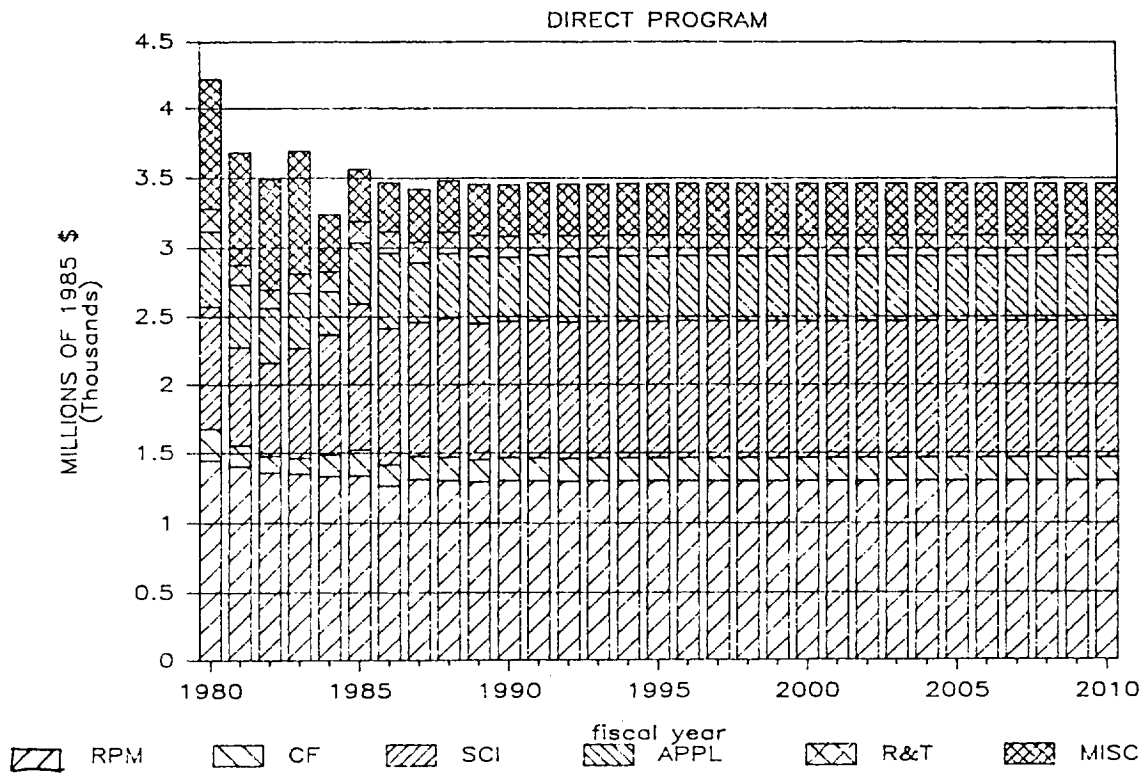


FIGURE 2
NASA BUDGET - SPACE FLIGHT

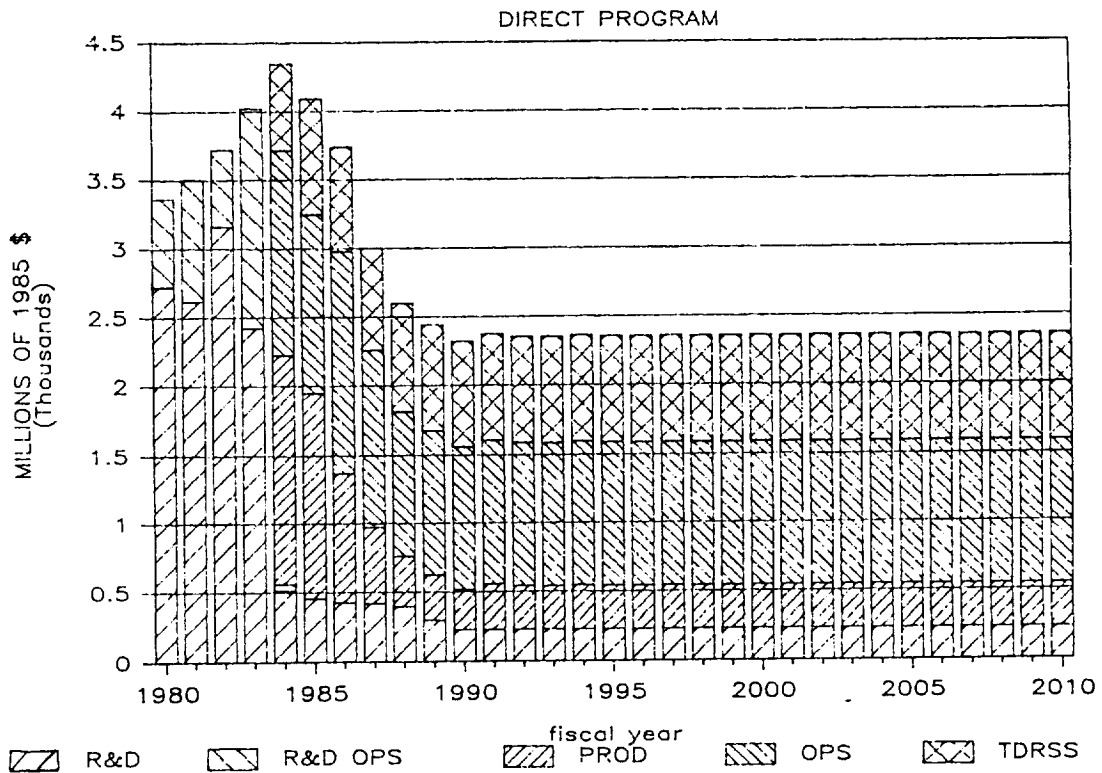


FIGURE 3

PLANNING PROFILE

SPACE STATION (SS)

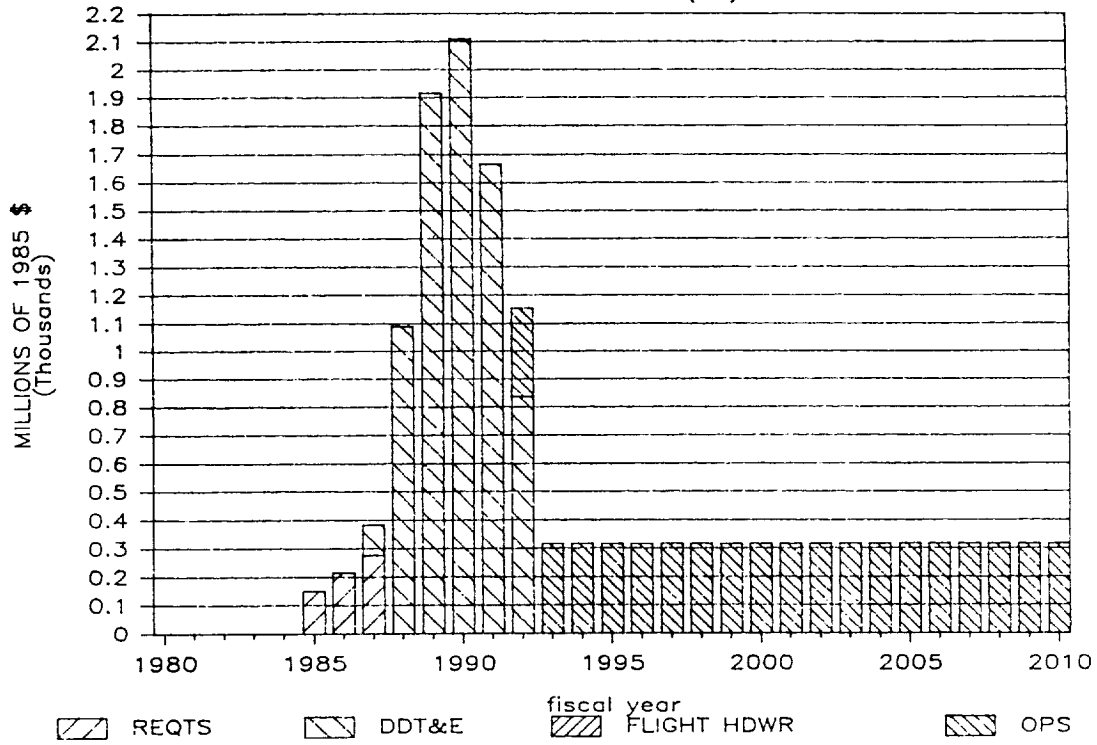


FIGURE 4

PLANNING PROFILE

Shuttle Derived Vehicle (SDV)

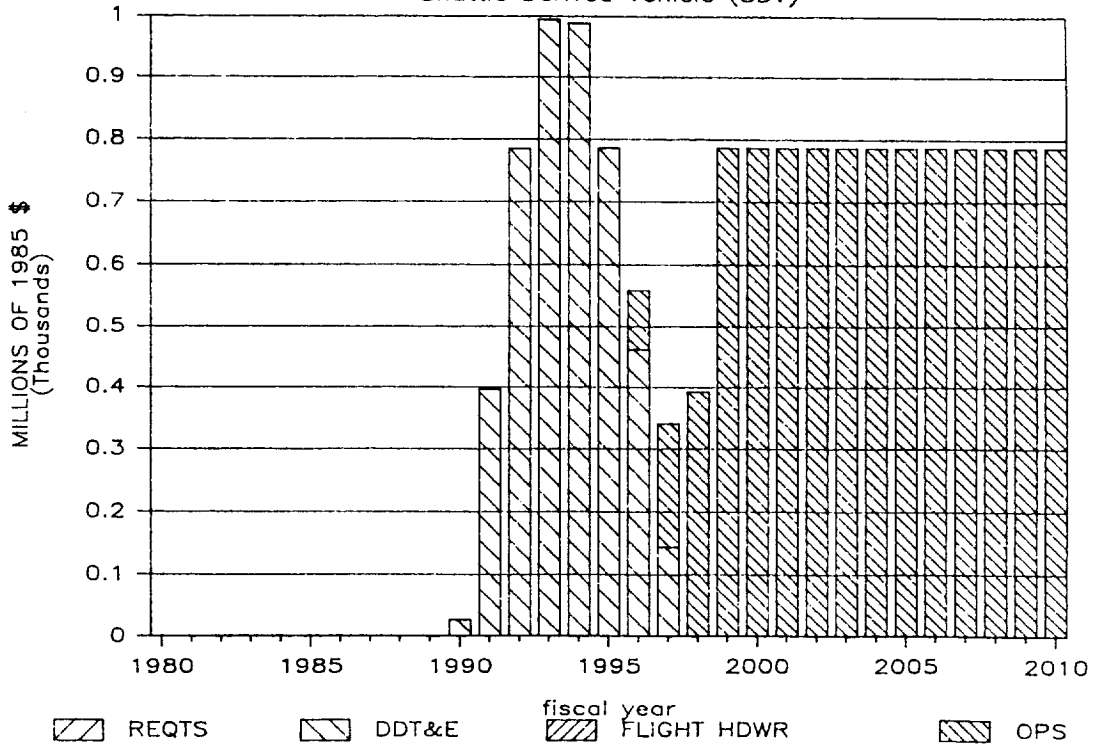


FIGURE 5

PLANNING PROFILE

Manned Mars Mission (MARS)

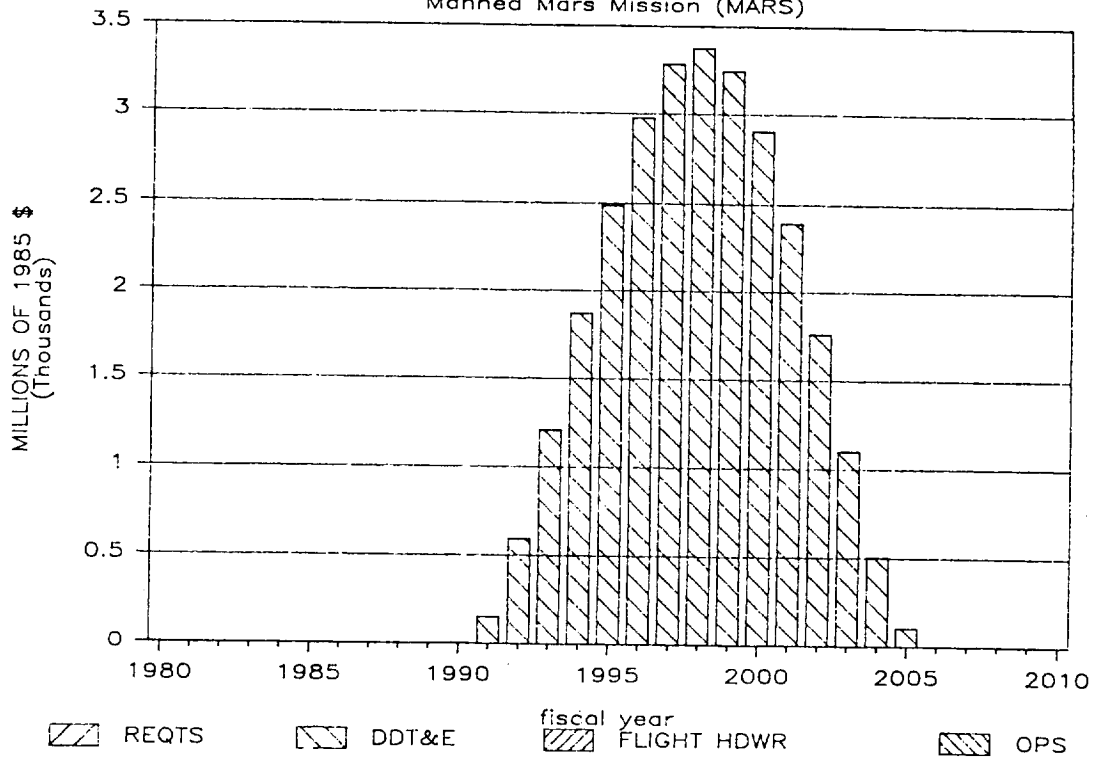
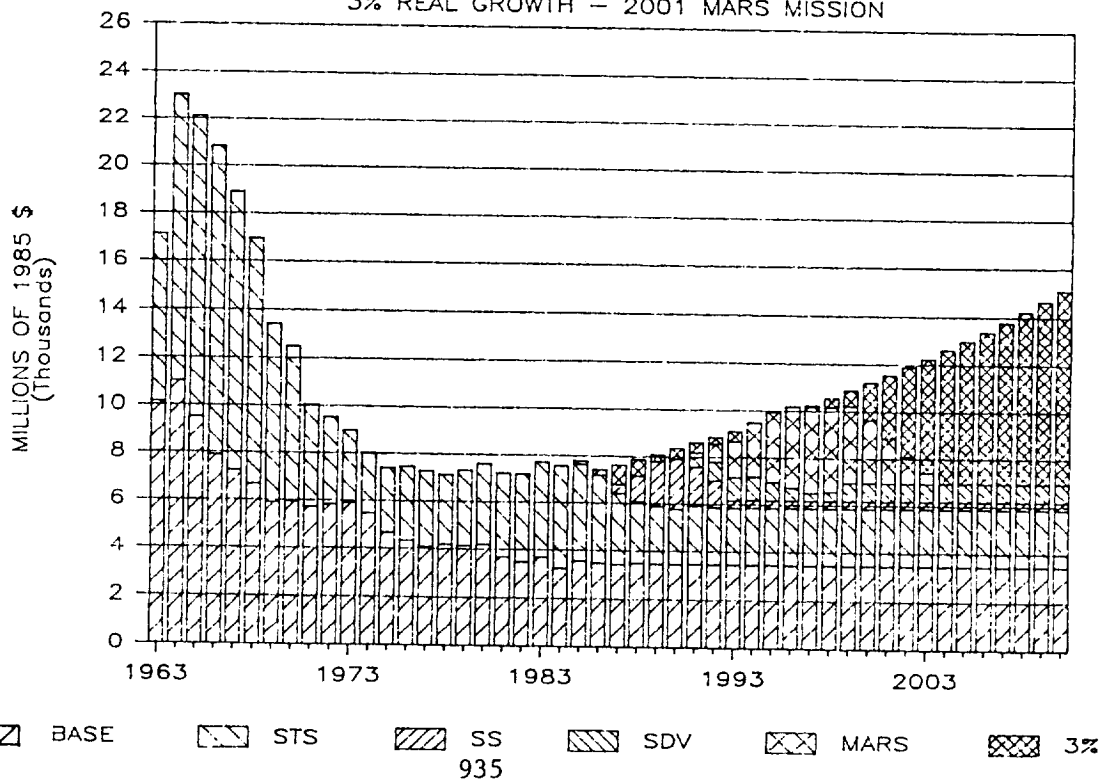


FIGURE 6

TOTAL NASA BUDGET

3% REAL GROWTH - 2001 MARS MISSION



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